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Redistribution of subfractional composition of resins after hydrothermal catalytic influences

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Abstract

© SGEM2018. The resins extracted from heavy oil sample from Ashalcha oilfield (Tatarstan, Russia) and the products of Co-based catalytic and non-catalytic aquathermolysis are investigated. Saturates and four subfractions of resins (R1-R4) are extracted by liquid adsorption chromatography method with individual and solvents. Fractionation method leads to obtain more detail information about the structure of high molecular weight compounds due to subdividing large molecule and its aggregates into small ones. The extracted subfractions of resins are different in color (R1-yellow, R2-orange, R3, R4-dark brown). The molecular weight of fractions is increasing with extracting from R1 to R4. The pattern of adsorption chromatographic separation of resin components allows us to substantially supplement the results of IR spectral analysis. The content of saturate hydrocarbons increases after catalytic aquathermolysis. It is revealed that a component redistribution occurred between the subfractions of resins and resins content decreases (mostly R1 and R2 fractions) due to catalytic aquathermolysis processes.

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Keywords

Complex structural units, Element analysis, Heavy oil, IR-spectroscopy, Resins

References

[1] Garushev A.R., Heavy oil and bituminous sands – are the assured sources for energy source supply in the future, Neftepromyslovoe delo (Oilfield engineering), Russia, issue 10, pp. 3-6, 1993.

[2] Yatsenko I.G., Polishuk Yu.M., The analysis of interrelation between the physical-chemical properties of heavy oils and thermal flux level on the areas of Volga-Ural, West-Siberian and Timan-Pechora basins, Neftegazovoe delo (Petroleum engineering), Russia, issue 2, 2007.

[3] Yusupova T.N., Ganeeva Yu.M., Romanov G.V., Barskaya E.E., Morozov V.I., Okhotnikova E.S., Vakhin A.V., Change in the structural-group composition of bitumen asphaltenes upon thermal bitumen recovery, Petroleum Chemistry, Russia, vol. 57, issue 3, pp. 198-202, 2017.

[4] Kayukova G.P., Mikhailova A.M., Feoktistov D.A., Morozov V.P., Vakhin A.V., Conversion of the Organic Matter of Domanic Shale and Permian bituminous Rocks in Hydrothermal Catalytic processes, Energy&Fuels, Russia, vol. 31, issue 8, pp. 7789-7799, 2017.

[5] Mullins O.C., The Modified Yen Model, Energy&Fuels, USA, vol. 24, issue 4, pp. 2179-2207, 2010.

[6] Michael G., Al-Siri M., Khan Z.H., Fatima A.A., Differences in average chemical structure of asphaltene fractions separated from feed and product oils of a mild thermal processing reaction, Energy&Fuels, Kuwait, vol. 19, pp. 1598-1605, 2005.

[7] Boek E.S., Yakovlev D.S., Headen T.F., Evidence for Asphaltene Nanoaggregation in Toluene and Heptane from Molecular Dynamics Simulations, Energy&Fuels, UK, vol. 23, issue 3, pp. 1209-1219, 2009.

[8] Vakhin A.V., Sitnov S.A., Mukhamatdinov I.I., Onishchenko Y.V., Feoktistov D.A. Aquathermolysis of High-Viscosity Oil in the Presence of an Oil-Soluble Iron-Based Catalyst, Chemistry and Technology of Fuels and Oils, Russia, vol. 53, issue 5, pp. 666-674, 2017.

[9] Perez-Hernandez R., Mendoza-Anaya D., Mondragon – Galicia G., Espinosa M.E., Rodrigues-Lugo V., Lozada M., Arenas-Alatorre J., Microstructural study of asphaltene precipitated with methylene chloride and n-hexane, Fuel, Mexico, vol. 82, issue 8, pp. 977-982, 2003.

[10] Salih I. Sh. S., Mukhamatdinov I. I., Garifullina E. I., Vakhin A. V. Study of Fractional Composition of Asphaltenes in Hydrocarbon Material, Chemistry and Technology of Fuels and Oils, vol. 54, issue 1, pp 44-50, 2018.

[11] Khairudinov I.R., Unger F.G., Syunyaev Z.I., Evaluation of component composition of complex structural units of petroleum disperse systems, Chemistry and Technology of Fuels and Oils, Russia, vol. 23, issue 6, pp. 297-300, 1987.

[12] Grinko A.A., Golovko A.K., Thermolysis of oil asphaltenes and their fractions, Petroleum Chemistry, Russia, issue 1, pp. 43-48, 2014.